IEC 60400

Edition 8.0 2017-06

INTERNATIONAL STANDARD

Lampholders for tubular fluorescent lamps and starterholders

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IEC 60400:2017-06(en)

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IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

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LAMPHOLDERS FOR TUBULAR FLUORESCENT LAMPS AND STARTERHOLDERS

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International Standard IEC 60400 has been prepared by subcommittee 34B: Lamp caps and holders, of IEC technical committee 34: Lamps and related equipment.

This eighth edition cancels and replaces the seventh edition published in 2008, Amendment 1:2011 and Amendment 2:2014. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) alignment with ISO/IEC drafting rules;

b) renumbering of clauses, tables and figures.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
34B/1900/FDIS	34B/1911/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

In this standard, the following print types are used:

– requirements proper: in roman type;
– *test specifications: in italic type;*
– notes: in smaller roman type.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
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LAMPHOLDERS FOR TUBULAR FLUORESCENT LAMPS AND STARTERHOLDERS

1 Scope

This document states the technical and dimensional requirements for lampholders for tubular fluorescent lamps and for starterholders, and the methods of test to be used in determining the safety and the fit of the lamps in the lampholders and the starters in the starterholders.

This document covers independent lampholders and lampholders for building-in, used with tubular fluorescent lamps provided with caps as listed in Annex A, and independent starterholders and starterholders for building-in, used with starters in accordance with IEC 60155, intended for use in AC circuits where the working voltage does not exceed 1 000 V r.m.s.

This document also covers lampholders for single-capped tubular fluorescent lamps integrated in an outer shell and dome similar to Edison screw lampholders (e.g. for G23 and G24 capped lamps). Such lampholders are tested in accordance with the following clauses and subclauses of IEC 60238: 9.4; 9.5; 9.6; 10.3; 11.7; 12; 13.2; 13.5; 13.6; 13.7; 14; 16.3; 16.4; 16.5 and 16.9.

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This document also covers lampholders which are integral with a luminaire or intended to be built into appliances. It covers the requirements for the lampholder only. For all other requirements, such as protection against electric shock in the area of the terminals, the requirements of the relevant appliance standard are applicable and tested after building into the appropriate equipment, when that equipment is tested according to its own standard. Lampholders for use by luminaire manufacturers only are not for retail sale.

This document also applies, as far as is reasonable, to lampholders and starterholders other than the types explicitly mentioned above and to lamp connectors.

Where the term "holder" is used in this document, both lampholders and starterholders are intended.

Where the term “bi-pin lampholder” is used, lampholders for wedged caps are also intended.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60061-2, *Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 2: Lampholders*

IEC 60061-3, *Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 3: Gauges*

IEC 60068-2-75:2014, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

IEC 60081, *Double-capped fluorescent lamps – Performance specifications*

IEC 60112:2003, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*
IEC 60112:2003/AMD1:2009

IEC 60155, *Glow-starters for fluorescent lamps*

IEC 60352-1:1997, *Solderless connections – Part 1: Wrapped connections – General requirements, test methods and practical guidance*

IEC 60399, *Barrel thread for lampholders with shade holder ring*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*
IEC 60529:1989/AMD1:1999
IEC 60529:1989/AMD2:2013

IEC 60598-1, *Luminaires – Part 1: General requirements and tests*

IEC 60695-2-11:2000, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (GWEPT)*

IEC 60695-11-5:2016 *Fire hazard testing – Part 11-5: Test flames – Needle-flame test method – Apparatus, confirmatory test arrangement and guidance*

ISO 4046-4:2016, *Paper, board, pulps and related terms – Vocabulary – Part 4: Paper and board grades and converted products*

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3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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ISO and IEC maintain terminological databases for use in standardization at the following addresses:

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- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
rated voltage
voltage declared by the manufacturer to indicate the highest working voltage for which the holder is intended

3.2
working voltage
highest r.m.s. voltage which may occur across any insulation, transients being disregarded, both when the lamp or starter is operating under normal conditions and when the lamp or starter is removed

3.3
flexible lampholders for linear double-capped fluorescent lamps
pair of lampholders in which the base of each holder is rigidly mounted in the luminaire but which has one or both of the lampholders so designed as to allow axial movement of the contacts to provide compensation for variations in lamp lengths and, where necessary, to permit insertion and removal of the lamp

Note 1 to entry: In case of doubt as to whether a lampholder G5, GX5 or G13 provides the required axial movement of the contacts, a test with the device shown in Figure 3 can be carried out.

3.4
inflexible lampholders for linear double-capped fluorescent lamps
pair of lampholders intended for rigid mounting and in which no axial movement of the contacts is provided or is needed, either for the insertion and removal of the lamp or as compensation for variation in lamp lengths

3.5
flexibly mounted lampholders for linear double-capped fluorescent lamps
pair of lampholders which do not in themselves provide for any axial movement of the contact system but which are intended to be mounted in a luminaire in a specified manner so that the combination provides the necessary axial movement of the contact system

Note 1 to entry: Lampholders of this type may or may not also be suitable for rigid mounting.

3.6
lamp connectors
set of contacts mounted on flexible conductors which provide for electrical contact but do not support the lamp

3.7
holder for building-in
holder designed to be built into a luminaire, an additional enclosure or the like

3.7.1
unenclosed holder
holder for building-in so designed that it requires additional means, for example an enclosure, to meet the requirements of IEC 60400 with regard to protection against electric shock

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3.7.2
enclosed holder
holder for building-in so designed that on its own it fulfils the requirements of IEC 60400 with regard to protection against electric shock and IP classification, if appropriate

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3.8
independent holder
holder so designed that it can be mounted separately from a luminaire and at the same time providing all the necessary protection according to its classification and marking

3.9
rated operating temperature
highest temperature for which the holder is designed

3.10
rated lampholder rearside temperature
rearside temperature for lampholders with T marking ascertained by test b) in 18.1 of IEC 60400, or a higher temperature as declared by the manufacturer

3.11
type test
test or series of tests made on a type test sample, for the purpose of checking compliance of the design of a given product with the requirements of the relevant standard

3.12
type test sample
sample consisting of one or more similar specimens submitted by the manufacturer or responsible vendor for the purpose of a type test

3.13
live part
conductive part which may cause an electric shock

3.14
rated ignition voltage
highest peak value of the ignition voltages the holder is able to withstand

3.15
multilamp ballast
electronic mains ballast designed and declared to comply for the application of lamps with different keys

3.16
impulse withstand category
numeral defining a transient overvoltage condition

Note 1 to entry: Impulse withstand categories I, II, III and IV are used.

a) Purpose of classification of impulse withstand categories

Impulse withstand categories are to distinguish different degrees of availability of equipment with regard to required expectations on continuity of service and on an acceptable risk of failure.

By selection of impulse withstand levels of equipment, insulation co-ordination can be achieved in the whole installation reducing the risk of failure to an acceptable level providing a basis for overvoltage control.

A higher characteristic numeral of an impulse withstand category indicates a higher specific impulse withstand of the equipment and offers a wider choice of methods for overvoltage control.

The concept of impulse withstand categories is used for equipment energized directly from the mains.

b) Description of impulse withstand categories

Equipment of impulse withstand category I is equipment which is intended to be connected to the fixed electrical installations of buildings. Protective means are taken outside the equipment – either in the fixed installation or between the fixed installation and the equipment – to limit transient overvoltages to the specific level.

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Equipment of impulse withstand category II is equipment to be connected to the fixed electrical installations of buildings.

Equipment of impulse withstand category III is equipment which is part of the fixed electrical installations and other equipment where a higher degree of availability is expected.

Equipment of impulse withstand category IV is for use at or in the proximity of the origin of the electrical installations of buildings upstream of the main distribution board.

3.17
primary circuit
circuit which is directly connected to the AC mains supply

Note 1 to entry: It includes, for example, the means for connection to the AC mains supply, the primary windings of transformers, motors and other loading devices.

3.18
secondary circuit
circuit which has no direct connection to a primary circuit and derives its power from a transformer, converter or equivalent isolation device, or from a battery

Note 1 to entry: *Exception*: autotransformers. Although having direct connection to a primary circuit, the tapped part of them is also deemed to be a secondary circuit in the above sense.

Note 2 to entry: Mains transients in such a circuit are attenuated by the corresponding primary windings. In addition, inductive ballasts reduce the mains transient voltage height. Therefore, components located after a primary circuit or after an inductive ballast can be suited for an impulse withstand category of one step lower, i.e. for impulse withstand category II.

3.19
basic insulation
insulation applied to live parts to provide basic protection against electric shock

Note 1 to entry: Basic insulation does not necessarily include insulation used exclusively for functional purposes.

3.20
supplementary insulation
independent insulation applied in addition to basic insulation in order to provide protection against electric shock in the event of a failure of basic insulation

3.21
double insulation
insulation comprising both basic insulation and supplementary insulation

3.22
reinforced insulation
single insulation system applied to live parts, which provides a degree of protection against electric shock equivalent to double insulation under the conditions specified

Note 1 to entry: The term "insulation system" does not imply that the insulation shall be one homogeneous piece. It can comprise several layers which cannot be tested singly as supplementary or basic insulation.

3.23
enclosed reinforced insulated lampholder
lampholder for building-in so designed that on its own it fulfils the requirements for double or reinforced insulated parts in class II applications

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3.24
partly reinforced insulated lampholder
lampholder for building-in, so designed that some parts of the lampholder require additional means to fulfil the requirements with regard to double or reinforced insulation

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Note 1 to entry: In some cases, the dimensions might be achieved only after mounting into the luminaire.

3.25
rated current
current declared by the manufacturer to indicate the highest current for which the lampholder is intended

[SOURCE: IEC 60838-1:2016 3.3]

3.26
critical frequency
$f_{\mathbf{crit}}$
frequency at which the reduction of the breakdown voltage of a clearance begins (occurs)

Note 1 to entry: $f_{crit} \approx 0{,}2/d$ [MHz] where d (in mm) is the clearance according to Table 3 (basic or supplementary insulation and reinforced insulation respectively) disregarding the frequency.

[SOURCE: IEC 61347-1:2015, 3.40, modified — the note has been added]

3.27
ignition voltage
peak voltage applied to ignite a discharge lamp

[SOURCE: IEC 61347-1:2015, 3.46]

3.27.1
ignition pulse voltage
peak ignition voltage with a total duration of ≤ 750 μs (summation of all pulse durations) within 10 ms, with the duration time (width) of each pulse being measured at the level of 50 % of the maximum absolute peak value

Note 1 to entry: Ignition pulse waveforms, which are considered as ignition pulse voltage, should not contain any dominant frequency above 30 kHz or should be usually highly damped (after 20 μs the peak voltage level should be less than one half of the maximum peak voltage). For the assessment of the dominant frequency IEC 60664-4:2005, Annex E should be consulted.

[SOURCE: IEC 61347-1:2015, 3.46.1]

3.28
maximum working voltage
U_{out}
maximum occurring working voltage (r.m.s.) between the output terminals of a controlgear or between the output terminals and earth, during normal or abnormal operating condition

Note 1 to entry: Transients and ignition voltages have to be neglected.

[SOURCE: IEC 61347-1:2015, 3.33, modified — "of a controlgear" has been added]

3.29
maximum working peak output voltage
$\hat{U}_{out}$
maximum repetitive occurring peak working voltage between the output terminals of a controlgear or between its output terminals and earth, during normal or abnormal operating condition and with transients neglected

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[SOURCE: IEC 61347-1:2015, 3.45, modified — "of a controlgear" has been added]

3.30
equivalent transformed peak voltage
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U_p
transformed output peak voltage, which is converted for the worst case peak voltage with its related frequency into an ignition pulse voltage

Note 1 to entry: The value of the declared equivalent transformed output peak voltage is the essential parameter for selecting the associated components.

Note 2 to entry: See 3.27.1.

Note 3 to entry: To determine the declared equivalent transformed output peak voltage for basic insulation U_p [basic] the worst case combination of the maximum occurring peak voltage and frequency has to be taken into account, which means the maximum clearance according to IEC 61347-1:2015, Table 10 for basic insulation.

Note 4 to entry: To determine the declared equivalent transformed output peak voltage for the reinforced insulation U_p [reinforced] the worst case combination of the maximum occurring peak voltage and frequency has to be taken into account, which means the maximum clearance according to IEC 61347-1:2015, Table 11 for reinforced insulation.

[SOURCE: IEC 61347-1:2015, 3.47]

4 General requirement

Holders shall be so designed and constructed that, in normal use, they function reliably and cause no danger to persons or surroundings.

In general, compliance is checked by carrying out all the tests specified.